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(19)

(54) SPRAY OIL

(71) We, THE BRITISH PETROLEUM COMPANY LIMITED, of Britannic House, Moor Lane, London, EC2Y 9BU, a British company,

do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to spray formulations containing fungicides for spraying growing plants, and to methods for treating growing plants by spraying with such spray formulations.

It is known to treat vines to control vine downy mildew (Plasmospora viticola) by spraying them with aqueous suspensions of Bordeaux mixture (copper sulphate and lime) and with aqueous suspension of mixtures containing copper oxychloride.

When it is desired to use oil based solutions or suspensions as spraying liquids, especially in applications when very low volumes of spraying liquids are used, it has been found that the previously used copper compounds settle out to form hard layers. This settling into hard layers is called hard settling, and can make redispersion of the compounds difficult.

We have discovered effective compounds which, when used in oil suspensions, suffer less from hard settling, and are also more effective as fungicides.

According to the invention there is provided a spray formulation comprising an oil carrier liquid and from 1 to 20% weight of a copper salt of a C1 to C16 carboxylic acid, based on the weight of oil and copper salt.

The copper salt can be either in solution or in suspension in the oil.

The copper salt chosen should not be unduly phytotoxic to the plant being sprayed.

Preferably the formulation comprises 5 to 15 per cent by weight of the copper salt based on the total weight of oil and copper salt.

Preferably the carboxylic acid is a C2 to C10 carboxylic acid, more preferably a straight chain monocarboxylic acid.

Examples of acids which can be used are formic, acetic, propionic and butyric acids. Acids in which other functional groups such as keto or hydroxyl groups or aromatic rings can also be used e.g. aceto acetic acid, or quinolinic acid.

The oil carrier liquid should be of low phytotoxicity to the plant to be sprayed and suitable oils include oils obtained by distillation of petroleum. These oils may be in the white spirit to lubricating oil boiling ranges and can be further refined, depending on the sensitivity of the plant to be treated.

Co-solvents for the copper salt such as ketones, alcohols, esters and phenols may also be used.

The invention also provides a method for treating growing plants which comprises spraying them with a spray oil formulation as described above.

The spray formulation is preferably used at a volume of 5—10 litres/hectare, using ultra-low volume techniques, on close growing plants e.g. vines.

Ultra-low volume sprayers and techniques using them are described in U.K. patents 722,527; 787,248; 876,066; 876,067; 1,105,651 and 1,165,652.

It has also been found that the copper salts of C1 to C16 carboxylic acids are also of improved effectiveness in suspension or in solution in oil/water emulsions. The invention also comprises formulations in which the oil is present in an oil/water emulsion. Preferably the emulsion comprises one part by weight of oil to 5 to 100 parts by weight water.

Preferably the formulateion comprising an oil/water emulsion comprises 1—2% wt. of the copper salt, based on the total weight of the formulation.

The rate of application of the emulsion is preferably 200—1000 litres/hectare of close growing plants e.g. vines.

Copper compounds are used for controlling fungal diseases of plants such as peach leaf curl (Taphrina deformans), potato and tomato blights (Phytophthora infestans), raspberry canespot (Elsinoe veneta) as well as vine downy mildew, and the formulations and methods of the inventions can be used to control these diseases.

As well as copper salts other conventional

spraying compounds such as zinc ethylene bis-dithiocarbamate can be used in the spray formulations.

The invention will now be described in the following Example.

EXAMPLE.

Vine leaf discs were sprayed in a Potter tower with known amounts of copper compounds dissolved or suspended in an oil. Each compound was applied at a range of concentrations, the rate of spraying was 10 litres/Ha of leaf surface.

TABLE

Copper Compound	Solution or Suspension	% Cu in compound	Controlling Level	
			μg Cu/sq. cm. leaf surface	Kg/Ha of compound
1. Oxychloride	Suspension	58	2—5	4.0
2. Dimethyldithiocarbamate	Solution	12	40	—
3. Ethylacetoacetonate	Suspension	20	0.5	1.2
4. Acetylacetonate	Suspension	24	0.2	0.4
5. Quinolinate	Suspension	18	0.5	1.4
6. Propionate	Suspension	30	0.5	0.9

The controlling dosages are expressed as μg of copper/sq. cm. of leaf surface. From the copper content of each compound and on the assumption the 1Ha of vines contain 5Ha leaf surface, the final column gives an estimate of the practical application rate for each column.

The oil compositions containing the organic copper salts, compositions 3, 4, 5 and 6 gave deposits which were less hard than those of composition 1. The oil used was a light lubricating oil.

As can be seen the formulations of the invention are more effective than the previously used formulation.

WHAT WE CLAIM IS:—

1. A spray formulation comprising an oil carrier liquid and from 1 to 20 per cent by weight of a copper salt of a C1 to C16 carboxylic acid, based on the weight of oil and copper salt.

2. A formulation as claimed in claim 1 which comprises 5 to 15 per cent by weight of the copper salt based on the weight of oil and copper salt.

3. A formulation as claimed in claim 1 or 2 in which the carboxylic acid is a C2—10 straight chain mono-carboxylic acid.

4. A formulation as claimed in any one of claims 1 or 2 in which the carboxylic acid is formic, acetic, propionic, butyric, aceto acetic, or quinolinic acid.

5. A formulation as claimed in any one of claims 1 to 4 in which the oil is present in an oil/water emulsion.

6. A formulation as claimed in claim 5 in which the copper salt is present in an amount of 1—2% weight based on the total weight of the formulation.

7. A formulation as claimed in claim 5 or 6 in which the oil/water emulsion comprises 1 part by weight of oil per 5 to 100 parts by weight water.

8. A formulation as claimed in claim 1 as hereinbefore described with reference to the Example.

9. A method of treating growing plants to reduce fungal infection which method comprises spraying the plants with a formulation as claimed in any one of the claims 1 to 4 or 8.

10. A method as claimed in claim 9 in which the formulation is sprayed on the crops in an amount of 5 to 10 litres per hectare.

11. A method of treating growing crops to reduce fungal infection which comprises spraying the crops with formulations as claimed in any one of claims 5 to 7.

12. A method as claimed in claim 11 in which the formulation is sprayed on the crops in an amount of 200 to 1000 litres per hectare.

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